

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

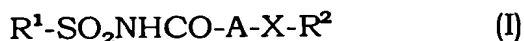
- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images,
please do not report the images to the
Image Problem Mailbox.**

WHAT IS CLAIMED IS

1. A sulfonamide compound of the formula (I):



wherein

- R^1 is an optionally substituted alkyl, an optionally substituted alkenyl, an optionally substituted alkynyl, an optionally substituted cyclo(lower)alkyl, an optionally substituted aryl or an optionally substituted heterocyclic group;
- A is an optionally substituted heteropolycyclic group except benzimidazolyl, indolyl, 4,7-dihydrobenzimidazolyl and 2,3-dihydrobenzoxazinyl;
- X is an alkylene, an oxa, an oxa(lower)alkylene, a lower alkylene-oxa, a carbonyl, a lower alkenylene, an optionally substituted imino, an optionally N-substituted imino(lower)alkylene, an optionally N-substituted lower alkyleneimino, a thioxa(lower)-alkylene or a lower alkyleneethioxa; and
- R^2 is an optionally substituted aryl, an optionally substituted heterocyclic group or a substituted biphenyl;

provided that when A is 3H-imidazo[4,5-b]pyridyl substituted by lower alkyl, R^2 is an optionally substituted aryl, an optionally substituted heterocyclic group or a biphenyl substituted by a group other than tetrazolyl, and when A is quinolyl substituted by lower alkyl, R^2 is an optionally substituted aryl, an optionally substituted heterocyclic group, or a biphenyl substituted by at least one group selected from the group consisting of alkyl, cyclo(lower)alkyl, alkenyl, alkynyl, lower alkanoyl, lower alkoxy, phenyl, heterocycle(lower)alkyl other than substituted tetrazolylmethyl, halogen, amino, substituted amino, lower alkylsulfonyl, lower alkylsulfinyl, lower alkylthio, cyano, carbamoyl, mono(lower)alkylcarbamoyl, di(lower)alkylcarbamoyl, nitro, halo(lower)alkyl, aryl(lower)alkyl, aryl(lower)alkenyl, aryl(lower)alkoxy, lower alkoxy substituted by substituted amino, cyclo(lower)alkyl(lower)alkoxy, cyclo(lower)alkyl(lower)alkyl, aryloxy(lower)alkyl, acyloxy(lower)alkyl, hydroxy(lower)alkyl, mono- or di(lower)alkylamino(lower)alkyl, aryl(lower)alkoxy(lower)alkyl, arylthio(lower)alkyl, heterocycle(lower)alkoxy, heterocycle-oxy(lower)alkyl, aryl(lower)alkylthio, arylureido, lower alkoxy(lower)alkoxy, aryl(lower)alkynyl, lower alkyl substituted by optionally substituted divalent heterocyclic group and optionally substituted heterocyclic group, or a salt thereof.

2. The sulfonamide compound of claim 1, wherein,

R^1 is an optionally substituted alkyl, an optionally substituted alkenyl, an

optionally substituted alkynyl, an optionally substituted cyclo(lower)alkyl, an optionally substituted aryl or an optionally substituted heterocyclic group, wherein, when these groups are substituted, the substituent is at least one member selected from the group consisting of alkyl, cyclo(lower)alkyl, alkenyl, alkynyl, lower alkanoyl, lower alkoxy, aryl, heterocycle(lower)alkyl, halogen, amino, substituted amino, lower alkylsulfonyl, lower alkylsulfinyl, lower alkylthio, cyano, carboxy, protected carboxy, carbamoyl, mono(lower)alkylcarbamoyl, di(lower)alkylcarbamoyl, nitro, halo(lower)alkyl, aryl(lower)alkyl, aryl(lower)alkenyl, aryl(lower)alkoxy, lower alkoxy substituted by substituted amino, cyclo(lower)alkyl(lower)alkoxy, cyclo(lower)alkyl(lower)alkyl, aryloxy(lower)alkyl, acyloxy(lower)alkyl, hydroxy(lower)alkyl, mono- or di(lower)alkylamino(lower)alkyl, aryl(lower)alkoxy(lower)alkyl, arylthio(lower)alkyl, heterocycle(lower)alkoxy, heterocycleoxy(lower)alkyl, aryl(lower)alkylthio, arylureido, lower alkoxy(lower)alkoxy, aryl(lower)alkynyl, lower alkyl substituted by optionally substituted divalent heterocyclic group and optionally substituted heterocyclic group;

A is a heteropolycyclic group having at least one hetero atom of oxygen atom, sulfur atom, selenium atom and nitrogen atom, exclusive of benzimidazolyl, indolyl, 4,7-dihydrobenzimidazolyl and 2,3-dihydrobenzoxazinyl, said heterocyclic group being optionally substituted by at least one member selected from the group consisting of alkyl, oxo, thioxo, halogen, lower alkoxy, lower alkylthio, cyclo(lower)alkyl, optionally substituted amino, aryl, heterocyclic group, lower alkylsulfonyl and lower alkylsulfinyl; and

R² is an optionally substituted aryl, an optionally substituted heterocyclic group or a substituted biphenyl, wherein, when these groups are substituted, the substituent is at least one member selected from the group consisting of alkyl, cyclo(lower)alkyl, alkenyl, alkynyl, lower alkanoyl, lower alkoxy, aryl, heterocycle(lower)alkyl, halogen, amino, substituted amino, lower alkylsulfonyl, lower alkylsulfinyl, lower alkylthio, cyano, carboxy, protected carboxy, carbamoyl, mono(lower)alkylcarbamoyl, di(lower)alkylcarbamoyl, nitro, halo(lower)alkyl, aryl(lower)alkyl, aryl(lower)alkenyl, aryl(lower)alkoxy, lower alkoxy substituted by substituted amino, cyclo(lower)alkyl(lower)alkoxy, cyclo(lower)alkyl(lower)alkyl, aryloxy(lower)alkyl, acyloxy(lower)alkyl, hydroxy(lower)alkyl, mono- or di(lower)alkylamino(lower)alkyl, aryl(lower)alkoxy(lower)alkyl, arylthio(lower)alkyl, heterocycle(lower)alkoxy, heterocycleoxy(lower)alkyl, aryl(lower)alkylthio, arylureido, lower alkoxy(lower)alkoxy, aryl(lower)alkynyl, lower alkyl substituted by optionally substituted divalent heterocyclic group and optionally substituted heterocyclic group;

provided that when A is 3H-imidazo[4,5-b]pyridyl substituted by lower alkyl, R² is

optionally substituted aryl, optionally substituted heterocyclic group or biphenyl substituted by a substituent other than tetrazolyl, and when A is quinolyl substituted by lower alkyl, R² is optionally substituted aryl, optionally substituted heterocyclic group or substituted biphenyl,

when the above-mentioned aryl and heterocyclic group are substituted, the substituent is at least one member selected from the group consisting of alkyl, cyclo(lower)alkyl, alkenyl, alkynyl, lower alkanoyl, lower alkoxy, phenyl, heterocycle(lower)alkyl, halogen, amino, substituted amino, lower alkylsulfonyl, lower alkylsulfinyl, lower alkylthio, cyano, carboxy, protected carboxy, carbamoyl, mono(lower)alkylcarbamoyl, di(lower)alkylcarbamoyl, nitro, halo(lower)alkyl, aryl(lower)alkyl, aryl(lower)alkenyl, aryl(lower)alkoxy, lower alkoxy substituted by substituted amino, cyclo(lower)alkyl(lower)alkoxy, cyclo(lower)alkyl(lower)alkyl, aryloxy(lower)alkyl, acyloxy(lower)alkyl, hydroxy(lower)alkyl, mono- or di(lower)alkylamino(lower)alkyl, aryl(lower)alkoxy(lower)alkyl, arylthio(lower)alkyl, heterocycle(lower)alkoxy, heterocycle-oxy(lower)alkyl, aryl(lower)alkylthio, arylureido, lower alkoxy(lower)alkoxy, aryl(lower)alkynyl, lower alkyl substituted by optionally substituted divalent heterocyclic group and optionally substituted heterocyclic group, and

the substituent for the above-mentioned biphenyl is at least one member selected from the group consisting of alkyl, cyclo(lower)alkyl, alkenyl, alkynyl, lower alkanoyl, lower alkoxy, phenyl, heterocycle(lower)alkyl other than substituted tetrazolylmethyl, halogen, amino, substituted amino, lower alkylsulfonyl, lower alkylsulfinyl, lower alkylthio, cyano, carbamoyl, mono(lower)alkylcarbamoyl, di(lower)alkylcarbamoyl, nitro, halo(lower)alkyl, aryl(lower)alkyl, aryl(lower)alkenyl, aryl(lower)alkoxy, lower alkoxy substituted by substituted amino, cyclo(lower)alkyl(lower)alkoxy, cyclo(lower)alkyl(lower)alkyl, aryloxy(lower)alkyl, acyloxy(lower)alkyl, hydroxy(lower)alkyl, mono- or di(lower)alkylamino(lower)alkyl, aryl(lower)alkoxy(lower)alkyl, arylthio(lower)alkyl, heterocycle(lower)alkoxy, heterocycle-oxy(lower)alkyl, aryl(lower)alkylthio, arylureido, lower alkoxy(lower)alkoxy, aryl(lower)alkynyl, lower alkyl substituted by optionally substituted divalent heterocyclic group and optionally substituted heterocyclic group, or a salt thereof.

3. The sulfonamide compound of claim 2, wherein,

R¹ is an optionally substituted alkyl, an optionally substituted alkenyl, an optionally substituted alkynyl, an optionally substituted cyclo(lower)alkyl, an optionally substituted phenyl or an optionally substituted heterocyclic group, wherein, when these groups are substituted, the substituent is at least one

member selected from the group consisting of alkyl, cyclo(lower)alkyl, alkenyl, alkynyl, lower alkanoyl, lower alkoxy, phenyl, heterocycle(lower)alkyl, halogen, amino, lower alkanoylamino, mono(lower)alkylamino, di(lower)alkylamino, N-(lower)alkyl-N-acylamino, lower alkylsulfonylamino, aryl(lower)alkylamino, N-heterocycle-N-(lower)alkylamino, arylsulfonylamino, arylcarbonylamino, lower alkylsulfonyl, lower alkylsulfinyl, lower alkylthio, cyano, carboxy, protected carboxy, carbamoyl, mono(lower)alkylcarbamoyl, di(lower)alkylcarbamoyl, nitro, halo(lower)alkyl, aryl(lower)alkyl, aryl(lower)alkenyl, aryl(lower)alkoxy, lower alkanoylamino(lower)alkoxy, mono(lower)alkylamino(lower)alkoxy, di(lower)alkylamino(lower)alkoxy, N-(lower)alkyl-N-acylamino(lower)alkoxy, lower alkylsulfonylamino(lower)alkoxy, aryl(lower)alkylamino(lower)alkoxy, N-heterocycle-N-(lower)alkylamino(lower)alkoxy, arylsulfonylamino(lower)alkoxy, arylcarbonylamino(lower)alkoxy, cyclo(lower)alkyl(lower)alkoxy, cyclo(lower)alkyl(lower)alkyl, aryloxy(lower)alkyl, acyloxy(lower)alkyl, hydroxy(lower)alkyl, mono- or di(lower)alkylamino(lower)alkyl, aryl(lower)alkoxy(lower)alkyl, arylthio(lower)alkyl, heterocycle(lower)alkoxy, heterocycle-oxy(lower)alkyl, aryl(lower)alkylthio, arylureido, lower alkoxy(lower)alkoxy, aryl(lower)alkynyl, lower alkyl substituted by optionally substituted divalent heterocyclic group and optionally substituted heterocyclic group; and

A is a heterodicyclic group of the following (A) to (I) exclusive of benzimidazolyl, indolyl, 4,7-dihydrobenzimidazolyl and 2,3-dihydrobenzoxazinyl, wherein said heterocyclic group is optionally substituted by at least one member selected from the group consisting of alkyl, oxo, thioxo, halogen, lower alkoxy, lower alkylthio, cyclo(lower)alkyl, amino, lower alkanoylamino, mono(lower)alkylamino, di(lower)alkylamino, N-(lower)alkyl-N-acylamino, lower alkylsulfonylamino, aryl(lower)alkylamino, N-heterocycle-N-(lower)alkylamino, arylsulfonylamino, arylcarbonylamino, aryl, heterocyclic group, lower alkylsulfonyl and lower alkylsulfinyl,

provided that when A is 3H-imidazo[4,5-b]pyridyl substituted by lower alkyl, R² is an optionally substituted aryl, optionally substituted heterocyclic group or biphenyl substituted by a group other than tetrazolyl, and when A is quinolyl substituted by lower alkyl, R² is an optionally substituted phenyl, optionally substituted naphthyl, optionally substituted heterocyclic group or substituted biphenyl,

the substituent for the above-mentioned phenyl, naphthyl and heterocyclic group being at least one member selected from the group consisting of alkyl, cyclo(lower)alkyl, alkenyl, alkynyl, lower alkanoyl, lower alkoxy, phenyl, heterocycle(lower)alkyl, halogen, amino, lower alkanoylamino,

mono(lower)alkylamino, di(lower)alkylamino, N-(lower)alkyl-N-acylamino, lower
 alkylsulfonylamino, aryl(lower)alkylamino, N-heterocycle-N-(lower)alkylamino,
 arylsulfonylamino, arylcarbonylamino, lower alkylsulfonyl, lower alkylsulfinyl,
 lower alkylthio, cyano, carboxy, protected carboxy, carbamoyl,
 mono(lower)alkylcarbamoyl, di(lower)alkylcarbamoyl, nitro, halo(lower)alkyl,
 aryl(lower)alkyl, aryl(lower)alkenyl, aryl(lower)alkoxy, lower
 alkanoylamino(lower)alkoxy, mono(lower)alkylamino(lower)alkoxy,
 di(lower)alkylamino(lower)alkoxy, N-(lower)alkyl-N-acylamino(lower)alkoxy, lower
 alkylsulfonylamino(lower)alkoxy, aryl(lower)alkylamino(lower)alkoxy, N-
 heterocycle-N-(lower)alkylamino(lower)alkoxy, arylsulfonylamino(lower)alkoxy,
 arylcarbonylamino(lower)alkoxy, cyclo(lower)alkyl(lower)alkoxy,
 cyclo(lower)alkyl(lower)alkyl, aryloxy(lower)alkyl, acyloxy(lower)alkyl,
 hydroxy(lower)alkyl, mono- or di(lower)alkylamino(lower)alkyl,
 aryl(lower)alkoxy(lower)alkyl, arylthio(lower)alkyl, heterocycle(lower)alkoxy,
 heterocycle-oxy(lower)alkyl, aryl(lower)alkylthio, arylureido, lower
 alkoxy(lower)alkoxy, aryl(lower)alkynyl, alkyl substituted by optionally substituted
 divalent heterocyclic group and optionally substituted heterocyclic group,
 the substituent for the above-mentioned biphenyl being at least one member
 selected from the group consisting of alkyl, cyclo(lower)alkyl, alkenyl, alkynyl,
 lower alkanoyl, lower alkoxy, phenyl, heterocycle(lower)alkyl other than
 substituted tetrazolylmethyl, halogen, amino, lower alkanoylamino,
 mono(lower)alkylamino, di(lower)alkylamino, N-(lower)alkyl-N-acylamino, lower
 alkylsulfonylamino, aryl(lower)alkylamino, N-heterocycle-N-(lower)alkylamino,
 arylsulfonylamino, arylcarbonylamino, lower alkylsulfonyl, lower alkylsulfinyl,
 lower alkylthio, cyano, carbamoyl, mono(lower)alkylcarbamoyl,
 di(lower)alkylcarbamoyl, nitro, halo(lower)alkyl, aryl(lower)alkyl, aryl(lower)alkenyl,
 aryl(lower)alkoxy, lower alkanoylamino(lower)alkoxy,
 mono(lower)alkylamino(lower)alkoxy, di(lower)alkylamino(lower)alkoxy, N-
 (lower)alkyl-N-acylamino(lower)alkoxy, lower alkylsulfonylamino(lower)alkoxy,
 aryl(lower)alkylamino(lower)alkoxy, N-heterocycle-N-
 (lower)alkylamino(lower)alkoxy, arylsulfonylamino(lower)alkoxy,
 arylcarbonylamino(lower)alkoxy, cyclo(lower)alkyl(lower)alkoxy,
 cyclo(lower)alkyl(lower)alkyl, aryloxy(lower)alkyl, acyloxy(lower)alkyl,
 hydroxy(lower)alkyl, mono- or di(lower)alkylamino(lower)alkyl,
 aryl(lower)alkoxy(lower)alkyl, arylthio(lower)alkyl, heterocycle(lower)alkoxy,
 heterocycle-oxy(lower)alkyl, aryl(lower)alkylthio, arylureido, lower
 alkoxy(lower)alkoxy, aryl(lower)alkynyl, lower alkyl substituted by optionally
 substituted divalent heterocyclic group and optionally substituted heterocyclic
 group, and

the above-mentioned heterocyclic group means the following (A) to (T):

- (A) saturated or unsaturated 7- to 12-membered heterobicyclic group having 1 to 4 nitrogen atoms
- (B) saturated or unsaturated 7- to 12-membered heterobicyclic group having 1 to 3 oxygen atoms
- (C) saturated or unsaturated 7- to 12-membered heterobicyclic group having 1 to 3 sulfur atoms
- (D) saturated or unsaturated 7- to 12-membered heterobicyclic group having 1 to 3 nitrogen atoms and 1 or 2 oxygen atoms
- (E) saturated or unsaturated 7- to 12-membered heterobicyclic group having 1 to 3 nitrogen atoms and 1 or 2 sulfur atoms
- (F) saturated or unsaturated 7- to 12-membered heterobicyclic group having 1 or 2 oxygen atoms and 1 or 2 sulfur atoms
- (G) saturated or unsaturated 7- to 12-membered heterobicyclic group having 1 nitrogen atom, 1 oxygen atom and 1 sulfur atom
- (H) saturated or unsaturated 7- to 12-membered heterobicyclic group having 1 or 2 selenium atoms
- (I) saturated or unsaturated 7- to 12-membered heterobicyclic group having 1 or 2 selenium atoms and 1 to 3 nitrogen atoms
- (J) unsaturated 3- to 8-membered heteromonocyclic group having 1 to 4 nitrogen atoms
- (K) saturated 3- to 8-membered heteromonocyclic group having 1 to 4 nitrogen atoms
- (L) unsaturated 3- to 8-membered heteromonocyclic group having 1 or 2 oxygen atoms and 1 to 3 nitrogen atoms
- (M) saturated 3- to 8-membered heteromonocyclic group having 1 or 2 oxygen atoms and 1 to 3 nitrogen atoms
- (N) unsaturated 3- to 8-membered heteromonocyclic group having 1 or 2 sulfur atoms and 1 to 3 nitrogen atoms
- (O) saturated 3- to 8-membered heteromonocyclic group having 1 or 2 sulfur atoms and 1 to 3 nitrogen atoms
- (P) unsaturated 3- to 8-membered heteromonocyclic group having 1 or 2 sulfur atoms
- (Q) unsaturated 3- to 8-membered heteromonocyclic group having 1 or 2 oxygen atoms
- (R) unsaturated 3- to 8-membered heteromonocyclic group having 1 oxygen atom
- (S) spiroheterocyclic group having 1 or 2 oxygen atoms
- (T) unsaturated 3- to 8-membered heteromonocyclic group having 1 oxygen

atom and 1 or 2 sulfur atoms,
or a salt thereof.

4. The sulfonamide compound of claim 3, wherein A is a heterocyclic group selected from the group consisting of 2,3-dihydrobenzimidazolyl, pyrazolopyrimidinyl, tetrahydropyrazolopyrimidinyl, imidazopyrazolyl, dihydroimidazopyrazolyl, imidazopyridyl, pyrrolopyridyl, pyrazolopyridyl, benzopyrazolyl, dihydrobenzimidazolyl, benzotriazolyl, indoliziny, isoindolyl, indazolyl, indoliny, isoindoliny, puriny, quinoliziny, isoquinolyl, quinolyl, phthalazinyl, naphthalidinyl, quinoxaliny, dihydroquinoxaliny, tetrahydroquinoxaliny, quinazoliny, dihydroquinazoliny, tetrahydroquinazoliny, cinnoliny, pteridinyl, pyrazinopyridazinyl, imidazotriazinyl, imidazopyrazinyl, imidazopyrimidinyl, imidazopyridazinyl, 1H-1-(or 2)pyrinediny, benzofuranyl, isobenzofuranyl, furopyridyl, chromenyl, chromanyl, isochromanyl, benzoxepiny, cyclopentapyranyl, furopyranyl, benzothiophenyl, dihydrodithianaphthalenyl, dithianaphthalenyl, dioxoloimidazolyl, benzoxazinyl, pyridoxazinyl, pyrazolooxazolyl, furopyridyl, thienoimidazolyl, thienopyridyl, dithiadiazaindany, thienofuranyl, oxathiolopyrroly, benzoselenophenyl, selenopyridyl, benzoselenol, selenopyridyl and cyclopentadienopyridyl, and said heterocyclic groups are optionally substituted by at least one member selected from the group consisting of lower alkyl and oxo,
or a salt thereof.

5. The sulfonamide compound of claim 4, wherein,
 R^1 is an alkyl, an alkenyl, a phenyl(lower)alkenyl, a quinolyl, a phenyl optionally substituted by a substituent selected from the group consisting of nitro, alkyl and alkenyl or a thienyl optionally substituted by halogen;
A is a heterocyclic group selected from the group consisting of 2,3-dihydrobenzimidazolyl, imidazopyrazolyl, imidazopyridyl, pyrrolopyridyl, pyrazolopyridyl, benzotriazolyl, indoliziny, indazolyl, quinolyl, dihydroquinoxaliny, tetrahydroquinoxaliny, dihydroquinazoliny, tetrahydroquinazoliny, benzofuranyl, benzothiophenyl and thienoimidazolyl, said heterocyclic group being optionally substituted by alkyl or oxo;
X is a lower alkylene, an oxa(lower)alkylene or an oxa; and
 R^2 is a phenyl optionally substituted by a substituent selected from the group consisting of alkyl, alkenyl, alkynyl, lower alkanoyl, lower alkoxy, phenyl, imidazolyl(lower)alkyl, piperidinyl(lower)alkyl, halogen, amino, lower alkanoylamino, mono(lower)alkylamino, di(lower)alkylamino, N-(lower)alkyl-N-(lower)alkanoylamino, N-(lower)alkyl-N-benzoylamino, lower alkylsulfonylamino,

phenyl(lower)alkylamino, phenylsulfonylamino, benzoylamino, lower alkylsulfonyl, lower alkylsulfinyl, lower alkylthio, cyano, carboxy, lower alkoxycarbonyl, cyclo(lower)alkyloxycarbonyl, mono(lower)alkylcarbonyl, nitro, halo(lower)alkyl, phenyl(lower)alkyl, phenyl(lower)alkenyl, phenyl(lower)alkoxy, (N-pyridyl-N-(lower)alkylamino)(lower)alkoxy, cyclo(lower)alkyl(lower)alkoxy, cyclo(lower)alkyl(lower)alkyl, phenoxy(lower)alkyl, lower alkylsulfonyloxy(lower)alkyl, hydroxy(lower)alkyl, di(lower)alkylamino(lower)alkyl, phenyl(lower)alkoxy(lower)alkyl, phenylthio(lower)alkyl, thienyl(lower)alkoxy, pyridyloxy(lower)alkyl, phenyl(lower)alkylthio, phenylureido, lower alkoxy(lower)alkoxy, phenyl(lower)alkynyl, dioxothiazolidylidene(lower)alkyl and thienyl optionally substituted by halogen; naphthyl optionally substituted by halogen; a 4-phenylphenyl substituted by halogen; a thienyl optionally substituted by halogen; a benzothienyl optionally substituted by halogen; a quinolyl optionally substituted by halogen; or a benzooxolanyl optionally substituted by halogen, or a salt thereof.

6. The sulfonamide compound of claim 5, wherein,

R¹ is an alkyl, an alkenyl, a phenyl(lower)alkenyl, a phenyl optionally substituted by a substituent selected from the group consisting of alkyl and alkenyl or a thienyl optionally substituted by halogen;

A is a heterocyclic group selected from the group consisting of 3H-imidazo[4,5-b]pyridyl, pyrazolo[1,5-a]pyridyl, indoliziny, 1H-indazolyl, benzo[b]furanyl and benzo[b]thiophenyl, said heterocyclic group being optionally substituted by one or two alkyl;

X is an alkylene; and

R² is a phenyl optionally substituted by a substituent selected from the group consisting of alkyl, alkenyl, alkynyl, lower alkoxy, phenyl, halogen, di(lower)alkylamino, lower alkylthio, lower alkoxycarbonyl, nitro, halo(lower)alkyl, phenyl(lower)alkyl, phenyl(lower)alkenyl, phenyl(lower)alkoxy, cyclo(lower)alkyl(lower)alkoxy, phenoxy(lower)alkyl, phenyl(lower)alkoxy(lower)alkyl, phenyl(lower)alkynyl and thienyl optionally substituted by halogen; a naphthyl optionally substituted by halogen; or a 4-phenylphenyl substituted by halogen, or a salt thereof.

7. The sulfonamide compound of claim 6, wherein,

A is a 3H-imidazo[4,5-b]pyridyl, a 1H-indazolyl or a benzo[b]furanyl, these heterocyclic groups being optionally substituted by alkyl; and

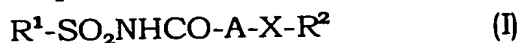
R² is a phenyl substituted by halogen, said phenyl being optionally substituted by a substituent selected from the group consisting of alkyl, alkenyl, alkynyl, lower alkoxy, phenyl, halogen, di(lower)alkylamino, lower alkylthio, lower alkoxycarbonyl, nitro, halo(lower)alkyl, phenyl(lower)alkyl, phenyl(lower)alkenyl, phenyl(lower)alkoxy, cyclo(lower)alkyl(lower)alkoxy, phenoxy(lower)alkyl, phenyl(lower)alkoxy(lower)alkyl, phenyl(lower)alkynyl and thienyl optionally substituted by halogen, or a naphthyl substituted by halogen, or a salt thereof.

8. The sulfonamide compound of claim 7, wherein A is 3H-imidazo[4,5-b]pyridyl substituted by 1 or 2 lower alkyl, or a salt thereof.

9. The sulfonamide compound of claim 7, wherein A is 1H-indazolyl substituted by one lower alkyl, or a salt thereof.

10. The sulfonamide compound of claim 7, wherein A is benzo[b]furanyl substituted by one lower alkyl, or a salt thereof.

11. A method for producing a compound of the formula (I)



wherein

- R¹ is an optionally substituted alkyl, an optionally substituted alkenyl, an optionally substituted alkynyl, an optionally substituted cyclo(lower)alkyl, an optionally substituted aryl or an optionally substituted heterocyclic group;
- A is an optionally substituted heteropolycyclic group except benzimidazolyl, indolyl, 4,7-dihydrobenzimidazolyl and 2,3-dihydrobenzoxazinyll;
- X is an alkylene, an oxa, an oxa(lower)alkylene, a lower alkylene-oxa, a carbonyl, a lower alkenylene, an optionally substituted imino, an optionally N-substituted imino(lower)alkylene, an N-substituted lower alkyleneimino, a thioxa(lower)alkylene or a lower alkyleneethioxa; and
- R² is an optionally substituted aryl, an optionally substituted heterocyclic group or a substituted biphenyl;

provided that when A is 3H-imidazo[4,5-b]pyridyl substituted by lower alkyl, R² is an optionally substituted aryl, an optionally substituted heterocyclic group or a biphenyl substituted by a group other than tetrazolyl, and when A is quinolyl substituted by lower alkyl, R² is an optionally substituted aryl, an optionally

substituted heterocyclic group, or a biphenyl substituted by at least one group selected from the group consisting of alkyl, cyclo(lower)alkyl, alkenyl, alkynyl, lower alkanoyl, lower alkoxy, phenyl, heterocycle(lower)alkyl other than substituted tetrazolylmethyl, halogen, amino, substituted amino, lower alkylsulfonyl, lower alkylsulfinyl, lower alkylthio, cyano, carbamoyl, mono(lower)alkylcarbamoyl, di(lower)alkylcarbamoyl, nitro, halo(lower)alkyl, aryl(lower)alkyl, aryl(lower)alkenyl, aryl(lower)alkoxy, lower alkoxy substituted by substituted amino, cyclo(lower)alkyl(lower)alkoxy, cyclo(lower)alkyl(lower)alkyl, aryloxy(lower)alkyl, acyloxy(lower)alkyl, hydroxy(lower)alkyl, mono- or di(lower)alkylamino(lower)alkyl, aryl(lower)alkoxy(lower)alkyl, arylthio(lower)alkyl, heterocycle(lower)alkoxy, heterocycle-oxy(lower)alkyl, aryl(lower)alkylthio, arylureido, lower alkoxy(lower)alkoxy, aryl(lower)alkynyl, lower alkyl substituted by optionally substituted divalent heterocyclic group and optionally substituted heterocyclic group, or a salt thereof, comprising the step of

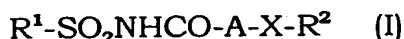
(1) reacting a compound of the formula (II)



wherein each symbol is as defined above, or a salt thereof, and a compound of the formula (III)

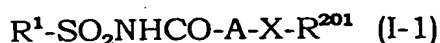


wherein each symbol is as defined above, or a reactive derivative thereof at carboxy or a salt thereof, to give a compound of the formula (I)



wherein each symbol is as defined above, or a salt thereof; or

(2) reducing a compound of the formula (I-1)

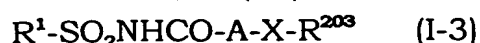


wherein R^{201} is an optionally substituted aryl, an optionally substituted heterocyclic group or a substituted biphenyl, all of which having at least alkynyl, aryl(lower)alkenyl, terminal nitro or terminal formyl and other symbols are as defined above, or a salt thereof, to give a compound of the formula (I-2)



wherein R^{202} is an optionally substituted aryl, an optionally substituted heterocyclic group or a substituted biphenyl, all of which having at least alkyl, aryl(lower)alkyl, terminal amino or hydroxymethyl, and other symbols are as defined above, or a salt thereof; or

(3) oxidizing a compound of the formula (I-3)



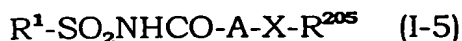
wherein R^{203} is an optionally substituted aryl, an optionally substituted heterocyclic group or a substituted biphenyl, all of which having at least terminal formyl, and other symbols are as defined above, or a salt thereof, to give a

comopund of the formula (I-4)

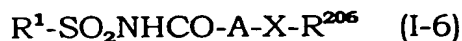


wherein R^{204} is an optionally substituted aryl, an optionally substituted heterocyclic group or a substituted biphenyl, all of which having at least carboxy, and other symbols are as defined above, or a salt thereof; or

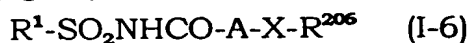
(4) acylating a compound of the formula (I-5)



wherein R^{205} is an optionally substituted aryl, an optionally substituted heterocyclic group or a substituted biphenyl, all of which having at least hydroxy(lower)alkyl, and other symbols are as defined above, or a salt thereof, to give a compound of the formula (I-6)



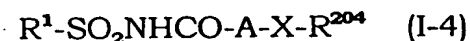
wherein R^{206} is an optionally substituted aryl, an optionally substituted heterocyclic group or a substituted biphenyl, all of which having at least acyloxy(lower)alkyl, and other symbols are as defined above, or a salt thereof; or (5) introducing an aryloxy group into a compound of the formula (I-6)



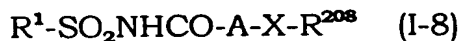
wherein each symbol is as defined above, or a salt thereof, to give a compound of the formula (I-7)



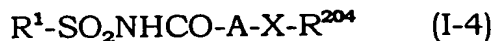
wherein R^{207} is an optionally substituted aryl, an optionally substituted heterocyclic group or a substituted biphenyl, all of which having at least aryloxy(lower)alkyl, and other symbols are as defined above, or a salt thereof; or (6) introducing a carboxy-protecting group into a compound of the formula (I-4)



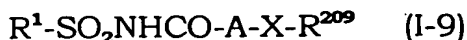
wherein each symbol is as defined above, or a reactive derivative thereof, to give a compound of the formula (I-8)



wherein R^{208} is an optionally substituted aryl, an optionally substituted heterocyclic group or a substituted biphenyl, all of which having at least protected carboxy, and other symbols are as defined above, or a salt thereof; or (7) amidating a compound of the formula (I-4)



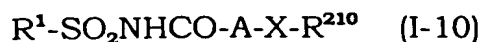
wherein each symbol is as defined above, or a reactive derivative thereof, to give a compound of the formula (I-9)



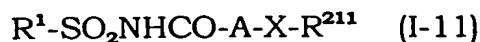
wherein R^{209} is an optionally substituted aryl, an optionally substituted heterocyclic group or a substituted biphenyl, all of which having at least optionally substituted amide, and other symbols are as defined above, or a salt

thereof; or

(8) adding a nitrogen-containing heterocyclic group to a compound of the formula (I-10)



wherein R^{210} is an optionally substituted aryl having at least a halogen atom, and other symbols are as defined above, or a salt thereof, to give a compound of the formula (I-11)



wherein R^{211} is an aryl substituted by at least heterocyclic group having nitrogen, and other symbols are as defined above, or a salt thereof.

12. A pharmaceutical composition comprising the sulfonamide compound of claim 1 or a pharmaceutically acceptable salt thereof.

13. A method for treating a disease treatable based on a blood sugar level-depressing activity or a disease treatable based on a cGMP-PDE inhibiting activity, smooth muscle relaxing activity, bronchodilating activity, vasodilating activity, smooth muscle cell suppressing activity or antiallergic activity, by the use of the sulfonamide compound of claim 1 or a pharmaceutically acceptable salt thereof.

14. A use of the sulfonamide compound of claim 1 or a pharmaceutically acceptable salt thereof for the production of a therapeutic agent for a disease treatable based on a blood sugar level-depressing activity, or a disease treatable based on a cGMP-PDE inhibiting activity, smooth muscle relaxing activity, bronchodilating activity, vasodilating activity, smooth muscle cell suppressing activity or antiallergic activity.